CITY OF Midland

City Hall • 333 West Ellsworth Street • Midland, Michigan 48640-5132 • 989.837.3300 • 989.835.2717 Fax • www.midland-mi.org

INVITATION TO BID
BID NO. 3661
REPLACEMENT PUMP DRIVES FOR WWTP

Sealed bids will be accepted at the City Clerk's Office, City Hall, 333 West Ellsworth Street, Midland, Michigan 48640-5132, until 2:00 PM, Tuesday, **October 28, 2014** for the supply of Replacement VFD Pump Drives for Wastewater per the attached specifications. Technical questions about this bid shall be directed to Steve Smith, WWTP Supervisor, at (989) 837-3504.

Invitation to Bid and all its pages, documents and attachments, including those added subsequently by written notice, submitted and properly executed, shall constitute the contract between the City of Midland and the successful vendor when approved and accepted by the City.

The City reserves the right to accept or reject all or any parts of any and all bids, to waive irregularities and to award in the best interests of the City of Midland.

Mike Meyer, CPPB, C.P.M.
Purchasing Agent
Midland, Michigan

CITY OF MIDLAND VFDS

SCOPE

The City of Midland is seeking bids for (2) variable frequency drives. These VFDs will be used to power sewage lift pumps. These pumps are all 480 volt 3 phase motors. The VFDs will power (1) 20 hp, and (1) 150 hp motors. A total of two VFD's will be required. The 150 hp drive will need the ability to bypass the drive through a magnetic starter. The 150 hp drive must be configured so that the width is a maximum of 36" and shall be an Allen Bradley PowerFlex drive. The 20 hp drive shall not require the bypass option and shall be configured to fit in an area 12"w x 22"h x 10" deep. Bids shall be submitted as two line items not lump sum. The City of Midland reserves the right to purchase the lower bid of each item.

PART 1: GENERAL

1.01 SUMMARY

A. This section provides specification requirements for solid-state, pulse-width modulated (PWM) Adjustable Frequency Drives, herein referred to as AC Drives, for use with NEMA® design AC motors.

B. The AC Drive manufacturer shall furnish, field test, adjust and certify all installed AC Drives for satisfactory operation.

C. Any exceptions/deviations to this specification shall be indicated in writing and submitted with the quotation.

1.02 REFERENCES

A. ANSI®/NFPA® 70 - National Electrical Code® (NEC®).

B. UL 508 - UL Standard for Safety Industrial Control Equipment.

C. UL 508C - UL Standard for Safety Power Conversion Equipment.

1.03 SUBMITTALS

A. Submittal packages including drawings shall be furnished for Engineers' approval prior to factory assembly of the AC Drives. These packages shall consist of elementary power and control wiring diagrams on one drawing and enclosure outline drawings. The enclosure drawings shall include front and side views of the enclosures with overall dimensions and weights shown, and conduit entrance locations. Standard catalog specification sheets showing voltage, horsepower and maximum current ratings shall be furnished as part of the submittal package.

1.04 WARRANTY

A. An 24-month parts warranty shall be provided on materials and workmanship from the date of purchase.

1.05 QUALITY ASSURANCE

A. The manufacturer of the AC Drive shall be a certified ISO 9001 facility.

B. The AC Drive and all associated optional equipment shall be UL Listed according to UL 508 C - Power Conversion Equipment. As verification, a UL label shall be attached on the inside of the combination enclosure.

C. The AC Drive shall be designed, constructed and tested in accordance with UL, CSA, NEMA, and NEC standards.

D. Every power converter shall be tested with an AC induction motor while loaded and temperature cycled within an environment chamber at 40 °C (104 °F).

E. All pilot devices shall be industrial rated and tested to verify proper operation.

PART 2: PRODUCT

2.01 MANUFACTURERS

A. The AC Drive for the 20 hp pump shall be provided by Square D Schneider Electric, Cutler Hammer, Allen Bradley,or prior approved equal. The 150hp drive shall be an Allen Bradley PowerFlex drive with bypass ability built in. Substitutions must be submitted in writing prior to original bid date with supporting documentation demonstrating that the alternative manufacturer meets all aspects of the specifications herein.

2.02 GENERAL DESCRIPTION

A. The AC Drive shall convert the input AC mains power to an adjustable frequency and voltage.

B. The input power section shall utilize a full wave bridge design incorporating diode rectifiers. The diode rectifiers shall convert fixed voltage and frequency, AC line power to fixed DC voltage.

C. The output power section shall change fixed DC voltage to adjustable frequency AC voltage.

D. The adjustable frequency NEMA 1 drive package shall consist of a circuit breaker disconnect, line fuses (if drive design requires line fuses for short circuit protection), 5% line reactor, EMI/RFI filter (if drive design requires RFI interference protection), Basic Drive Module, 3 contactor bypass, 120V control transformer, control circuit terminal board for digital and analog field wiring.

D. The VFDs shall include a complete magnetic three phase bypass that isolates the VFDs when in the bypass mode. Transfer to the bypass mode shall be automatic in the event of VFD or power failure. Overload protection shall be provided for all motors when the VFDs are operating in the bypass mode. Standard heaters may be used to provide this protection.

E. The drive door shall have mounted and wired, Hand-Off-Auto switch, Manual Speed Potentiometer, POWER ON light, AFC RUN light, FAULT light, Test–Normal switch or equivalent.

F. The entire drive package, including the bypass starter circuit shall be UL508C listed, rated for variable torque pump applications.

G. No VFDs shall be mounted integral to the equipment.

H. All VFDs shall be supplied by one manufacture only.

I. All enclosures shall have a name plate that clearly shows input voltage, power converter number, permissible input voltage, Max continuous output current, Max input current, line and load terminations, enclosure catalog number including options and factory order number.

2.03 CONSTRUCTION

A. The AC Drive power converter shall be enclosed in a NEMA Type 1 enclosure with a circuit breaker disconnect, industrial rated operator controls, user terminal strip connections and bypass controls, if required. The enclosure shall provide dedicated user terminals for power and control device connection.

B. Provisions shall be included for locking the disconnect in the OFF position with a padlock.

D. All enclosure and heat sink fans shall be accessible from the front and shall not require the removal of the AC drive power converter. The fans and intake louvers on the Allen Bradley PowerFlex shall not be located on the sides of the enclosure. They can be located on the bottom, top, or in the door only.

2.04 MOTOR DATA

A. The AC Drive shall be sized to operate the following AC motor:

1. Motor horsepower: (1)150HP, (1) 5HP, (2) 25HP Sewage Pumps

2.05 APPLICATION DATA

A. The AC Drive shall be sized to operate a variable torque load.

B. The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 60 Hz.

2.06 ENVIRONMENTAL RATINGS

A. The AC Drive shall meet IEC 60664-1 Annex A and NEMA ICS 1, UL, and CSA standards.

B. The AC Drive shall be designed to operate in an ambient temperature from -10 to 40 °C (14 to 104 °F).

C. AC Drives in Type 3R enclosures shall be designed to operate in an ambient temperature from -10 to 50 °C (14 to 122 °F).

D. The storage temperature range shall be -25 to 65 °C (-13 to 149 °F).

E. The maximum relative humidity shall be 95%, non-condensing.

F. The AC Drive shall be rated to operate at altitudes less than or equal to 3300 ft (1000 m). For altitudes above 3300 ft (1000 m), de-rate the AC Drive by 1% for every 330 ft (100 m).

G. The AC Drive shall meet the IEC 60721-3-3-3M3 operational vibration specification.

H. The AC Drive shall be Seismic Qualified to 2000 IBC Level 3 "Extreme" rating with an Importance Factor 1p=1.5

2.07 RATINGS

A. The AC Drive shall be designed to operate from an input voltage of: 460 Vac (±) 10%

B. The AC Drive shall operate from an input frequency range of 60 Hz (±) 5%.

C. The displacement power factor shall not be less than .98 lagging under any speed or load condition.

D. The efficiency of the AC Drive at 100% speed and load shall not be less than 97%.

E. The variable torque rated AC Drive over current capacity shall be not less than 110% for 1 minute.

F. The output carrier frequency of the AC Drive shall be programmable at 0.5, 1, 2, 4 or 8 kHz. In addition, the output carrier frequency shall be randomly modulated about the selected frequency and set not to exceed 4 kHz

2.08 PROTECTION

A. Upon power-up, the AC Drive shall automatically test for valid operation of memory, loss of analog reference input, loss of communication, DC-to-DC power supply, control power and pre-charge circuit.

B. The enclosure shall provide a fully coordinated 100,000 AIC current rating marked on the enclosure nameplate. Short circuit coordination to UL 508C Power Conversion Equipment and NEMA ICS 7.1.

C. The AC Drive shall be protected against short circuits, between output phases and to ground.

D. The AC Drive shall have a minimum AC undervoltage power loss ride-through of 200 milliseconds (12 cycles).

E. The AC drive shall have a programmable ride-through function, which will allow the logic to maintain control for a minimum of one-second (60 cycles) without faulting.

F. For a fault condition other than a ground fault, short circuit or internal fault, an auto restart function will provide up to 6 programmable restart attempts. The time delay before restart attempts will be 30 seconds.

G. Upon loss of the analog process follower reference signal, the AC Drive shall be programmable to display a fault.

H. The AC Drive shall have a solid-state UL 508 C listed overload protective device and meet IEC 60947.

I. The output frequency shall be software enabled to fold back when the motor is overloaded.

J. There shall be three skip frequency ranges that can be programmed to a bandwidth of ± 2.5 Hz.

K. The AC Drive should have dedicated landing points to be able to protect the motor when PTC probes are connected.

L. The AC drive should be able to limit the motor surge at twice the DC bus voltage. The drive shall correspond the attenuation time of the cable used to prevent the superimposition of voltage wave reflections resulting from long cable lengths or **a sinus filter for DV/DT protection must be used**.

M. The AC drive shall display all faults in plain text and help screens shall be available to guide the user in the troubleshooting. **No fault codes are acceptable**.

2.09 ADJUSTMENTS & CONFIGURATIONS

A. The AC Drive will be factory programmed to operate all specified optional devices.

B. The acceleration and deceleration ramp times shall be adjustable from 0.05 to 999.9 seconds.

C. The memory shall retain and record run status and fault type of the past 8 faults.

D. The software shall have an energy economy function that, when selected, will reduce the voltage to the motor when selected for variable torque loads. A constant volts/Hz ratio will be maintained during acceleration. The output voltage will then automatically adjust to meet the torque requirement of the load.

2.10 KEYPAD DISPLAY INTERFACE

A. A keypad display interface shall offer the modification of AC Drive adjustments through a touch keypad. All electrical values, configuration parameters, I/O assignments, application and activity function access, faults, local control, and adjustment storage, and diagnostics shall be in plain English. **NO codes will be acceptable**.

B. The AC Drive model number, torque type, software revision number, horsepower, output current, motor frequency and motor voltage shall be listed on the drive identification portion of the LCD display.

2.11 CONFIGURATION SOFTWARE

A. A complete version of the software for configuring the variable frequency drive shall be provided. Any cables needed to connect laptop to drive shall also be provided with the drive.

2.11 OPERATOR CONTROLS

A. The AC drive shall have a detachable keypad with a back lit 8-line, with a minimum of 23-character alphanumeric operating display for programming and controlling purposes. An IP54 or IP65 remote mounting shall be possible at a distance of 10m. The programming shall be

able to operate in a multi-point connection. The displayed messages shall be in user friendly, descriptive text in multiple languages, including English, German, French, Italian, Spanish and Chinese. It shall be possible to change to replace 5 languages by other ones by a simple download. Coded messages are not acceptable.

B. Using a shuttle button shall carry out the navigation in the menu and the parameter setting.
C. Parameter setting shall be easily accessible and user friendly with actual text messages and actual setting range.
D. Visibility and protection shall be selected for each parameter. Password protection shall be provided to avoid unauthorized tampering with the set parameters.
E. The programming terminal shall offer the possibility of memorizing and downloading 4 configurations of the AC drives to save time during the commissioning and to avoid mistakes.
F. Direct access to the 10 last modifications shall be provided.
G. 4 programmable function keys shall be available for short cuts, application functions
H. Monitoring shall be possible up a distance of 5 meters. By using digital values and/or bar graph. Dedicated functions shall be provided such as I/O map, Communication map.
I. The programming terminal shall be able to display the commercial reference of the AC drive and of the options, the software version, the serial number
J. The user shall be able to customize the interface :
    - Creation of a user menu
    - Customization of 15 parameters : name, scaling, unit
    - Integration of bitmaps
K. The programming terminal shall integrate a Simply Start menu for fast and easy commissioning.
L. Direct keypad entry shall be provided to observe the following actual parameters. Any two of the following parameters or actual values shall be selected to be always displayed.
    - Input Voltage
    - Input Frequency
    - Output Voltage
    - Output Frequency
    - DC Bus Voltage
    - Output Power
    - Output Torque
    - Output Current
    - Motor Speed

The following parameters shall always be displayed during normal operation.

- Drive Status
- Command source (terminal, keypad, ...)

M. The AC Drive shall have self-diagnostic properties to display faults and warnings as they occur and be able to store at least 8 last faults into the fault memory including. The fault memory shall be accessible by PC maintenance tools.
N. The following drive control functions at least shall be available from the keypad:
    - Run
    - Stop
    - Local / Remote selection.
    - Forward/Reverse (if function enabled)
    - Accelerate
    - Decelerate
    - Parameter setting
    - Scrolling & Viewing through Actual values

O. The internal power supply shall incorporate automatic current fold-back that protects the internal power supply if incorrectly connected or shorted. The transistor logic outputs will be current limited and will not be damaged if shorted.

P. Pull-apart terminal strips shall be used on all logic and analog signal connections in the power converter.

Q. Two voltage-free relay output contacts will be provided. One of the contacts will indicate AC Drive fault status. The other contact shall indicate a drive run status.

R. The combination enclosure shall have the following dedicated operator controls:

1. Hand-Off-Auto switch [Start-Stop push button and Hand-off-Auto switch] [Start-Stop push button]
2. Manual Speed Potentiometer
3. Power On (red) LED indicator
4. Drive Run (green) LED indicator
5. Drive Fault (yellow) LED indicator
6. Auto Mode (yellow) or Bypass Run (yellow) LED indicator

2.12 SERIAL COMMUNICATION

A. The AC Drive shall have serial communication options of LONWORKS®, BACNET®, MODBUS®, METASYS® N2, APOGEE® P1, ETHERNET or PROFIBUS.

2.13 HARMONIC MITIGATION

A. The electrical distribution system has been designed to meet IEEE-519-1992 with a 5% line reactors. These line reactors shall be mounted inside the drive enclosure.

2.15 Harmonic Distortion

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Note to Specifier: Guidelines for voltage and current distortion are addressed in IEEE Standard 519-1992 titled "IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems", which suggests distortion limits dependent upon the electric power distribution system for industrial and commercial consumers. Collectively, all facility loads and the building electrical distribution network determines the harmonic levels at the user & electric utility interface. The Electrical Power Research Institute (EPRI) recognizes the 'Point of Common Coupling' or PCC as the interface between user and electric utility (energy meter) in the electrical distribution network. The AC Drives manufacturer can provide calculations through computer modeling, specific to the installation, showing total harmonic voltage distortion. Contractor to provide one line diagram drawings to supplier including transformer impedance. The AC Drive manufacturer needs this information.

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A harmonic distortion analysis shall be performed and priced as a separate line item by the AC Drive manufacturer based upon documentation supplied by the contractor. The documentation shall consist of one-line diagrams, distribution transformer information (kVA, %Z, and X/R ratio) and emergency standby generator performance specifications. The harmonic distortion analysis report shall be part of the approval drawing process, submitted to the engineer for approval.

If the calculations determine that harmonic distortion values are higher than the voltage and current values specified, the drive manufacturer shall provide solutions to comply with :

- IEC 61800-3-12
- IEEE 519-1992 guidelines.

PART 3: INSTALLATION

3.01 TRAINING

A. An on-site training course of one training day shall be provided by a representative of the AC Drive manufacturer to plant and/or maintenance personnel.

3.02 DOCUMENTATION

A. The AC Drive manufacturer shall supply 3 comprehensive 8-1/2 x 11-inch bound instruction/installation manual that includes wiring diagrams, layout diagrams, and outline dimensions. This manuals must be 3-hole punched for insertion in a shop manual supplied by the installing contractor.

3.03 SHIPPING

A. Bid shall include shipping to the wastewater plant at 2125 Austin, Midland, MI 48640.

CITY OF MIDLAND, MICHIGAN
STANDARD INSTRUCTIONS TO BIDDERS

1. **Receipt and Opening of Bids:** Sealed bids will be accepted and date/time stamped upon receipt in the office of the City Clerk, City Hall, 333 West Ellsworth, Midland, MI 48640-5132, until the time indicated on the attached Invitation to Bid for goods or services listed in the specifications and will be publicly opened and read aloud.

2. **Form of Bid:** Bids shall be submitted on the enclosed form with any exceptions, deviations or modifications to the published requirements clearly noted and explained.

3. **Submission of Bids:**
   A) Envelopes containing bids shall be sealed and clearly marked on the outside of the envelope with the name and address of the bidder, the title and bid number of the project, and the date and time of the scheduled bid opening.
   B) Any bid received after the scheduled opening time will not be accepted and will be returned unopened.
   C) Any bidder may withdraw their bid response by written request at any time prior to the scheduled bid opening.
   D) Telephonic or faxed bids will not be accepted and telephonic, telegraphic, or faxed amendments to bids or withdrawals will not be accepted under any circumstances.
   E) Unless otherwise specified, no bid may be withdrawn, changed, or modified in any way for a period of sixty (60) calendar days from the date of the bid opening.
   F) Negligence on the part of the bidder in preparing the bid confers no rights for the withdrawal of the bid after opening.
   G) Bids received prior to the time of bid opening will be securely kept unopened. No responsibility will attach to any officer or employee of the City for the premature opening of a bid not properly addressed or identified.
   H) In case of a discrepancy between unit prices and their extensions, the unit price bid shall govern.

4. **Brand Names:** Wherever in the specifications or proposal form brand names, trade names, manufacturer, or catalog numbers are called, it is for establishing a grade or quality level only and the phrase "or equal" is deemed to follow unless a prequalified list or the term "only", "no exceptions", or similar phrase is included.

5. **Taxes:** The City of Midland is exempt from State and Federal taxes. However, property purchased by a contractor to be used in the construction, alteration, repair, or improvement of property owned by the City is taxable to the contractor. Therefore, the price bid for contracts other than construction contracts must be exclusive of taxes and will be so construed. Construction contracts will be construed to include all applicable taxes unless the contract specifies otherwise.

6. **Acceptance of Bids:** The City will award to the lowest, responsive, responsible vendor that meets the functional requirements and needs expressed by the specifications. Tie bids will be awarded based on the most favorable terms for payment and/or delivery schedule or other costs associated with the award process. Receipt of a purchase order or properly executed contract covering the materials or services as described in the bid will indicate the award of bid and contract of purchase.

7. **City's Rights:** The City reserves the right to accept or reject any or all bids, to waive irregularities or defects, to award on a split-order or lump-sum basis, and accept other than the low bid when deemed to be in the City's best interests.

8. **Delivery:** Bids shall include all delivery charges with terms of Freight Prepay - FOB Midland, MI.

9. **Laws:** The laws of the State of Michigan shall govern the rights, obligations, and remedies of the Parties under this bid and any agreement reached through this process. The City of Midland is a Michigan municipal corporation.

10. **Disclosure:** All of the information included in your bid response is subject to the "Freedom of Information Act" and may be disclosed in its entirety after the formal, public bid opening has been completed. Bid tabulations will be available at on the City's website, www.cityofmidlandmi.gov in the Purchasing section of the Fiscal Services Department under the City Government tab.

11. **Independent Price Determination:** By submission of this proposal, the bidder certifies that the pricing structure offered has been arrived at independently without consultation, communication, or agreement of such prices for the purpose of restricting competition with any other bidder or competitor.

12. **Acceptance of Materials:** All components used in the manufacture or construction of materials, supplies, and equipment, and all finished goods, shall be new, the latest make/model, of the best quality, and highest grade workmanship. In the event the delivered material is found to be defective or does not conform to specifications, the City reserves the right to cancel the order upon written notice to the bidder and return the materials to the bidder at the bidder's expense.

13. **Non-Iran Linked Business:** By signing below, I certify and agree on behalf of myself and the company submitting this proposal the following: (1) that I am duly authorized to legally bind the company submitting this proposal; and (2) that the company submitting this proposal is not an "Iran linked business," as that term is defined in Section 2(e) of the Iran Economic Sanctions Act, being Michigan Public Act No. 517 of 2012; and (3) That I and the company submitting this proposal will immediately comply with any further certifications or information submissions requested by the City in this regard."

RESPONSE FOR BID NO. 3661
REPLACEMENT PUMP DRIVES FOR WWTP
BID OPENING: October 28, 2014 AT 2:00 PM

In compliance with the City of Midland's specifications and Standard Instructions to Bidders, the undersigned hereby proposes to furnish for the price of:

QTY	DESCRIPTION	UNIT PRICE
1	Replacement VFD of 150 hp Pump per City requirements.	$_____
1	Replacement VFD for 20hp Pump per City requirements.	$_____
	TOTAL BID	$_____

IF VARIATIONS ARE PROPOSED, LIST VARIATIONS ON SEPARATE SHEET OF PAPER AND RETURN WITH THE BID RESPONSE FORM. ENCLOSE MANUFACTURER'S DESCRIPTIVE LITERATURE OR BROCHURE.

I hereby state that all of the information I have provided is true, accurate, and complete. I hereby state that I have the authority to submit this bid, which will become a binding contract, if accepted by the City of Midland. I hereby agree to abide by all City ordinances, rules and regulations including the suspension process for poor performance arising out of this contract, if awarded.

_____ COMPANY NAME

_____ STREET ADDRESS OR PO BOX

_____ CITY STATE ZIP CODE

_____ TELEPHONE NUMBER

_____ TERMS OF PAYMENT

_____ BY (Signature)

_____ (Print Name of Above)

_____ TITLE OF SIGNATORY

_____ DATE OF OFFER

_____ ESTIMATED DELIVERY AFTER RECEIPT OF ORDER

Bids shall be returned to the Office of the City Clerk, City Hall, 333 West Ellsworth, Midland, MI 48640-5132 no later than the time and date listed above. Sealed envelopes shall be marked with the bid number, title, and opening date.
Bids may be inspected at the bid opening or in the Purchasing Office during normal business hours. Tabulations will be available at our website, www.cityofmidlandmi.gov under the Purchasing Department.

LATE BIDS WILL BE REJECTED.